nated in the vicinity of Woodford, a village ten miles south of Dayton, and moved in an easterly course. At Alexandersville, six miles south of Dayton, a number of buildings were destroyed and several persons were injured. The tornado was also very destructive at Woodburn, Miamisburg, Bellbrook, Carrollton, and Jamestown. At Jamestown six persons were killed and about two-thirds of the buildings in town were ruined. The damage is estimated at from $150,000 to $200,000. At Bellbrook about fifteen buildings were more or less damaged.

Pennsylvania.—Pittsburg: on the morning of the 2d the Monongahela valley was visited by a violent storm, which caused a large amount of damage. The storm's course was along the south side of the Monongahela river. At Homestead, Alleghany county, several buildings were blown down.

South Carolina.—Summerville, Berkeley county: a violent northwesterly wind storm prevailed on the 2d. No damage occurred other than the blowing down of fences and a few trees.

Columbia: a very high wind prevailed on the 2d, which blew down fences and trees and caused slight injury to a few buildings.

Texas.—Del Rio, Kenney county: a tornado occurred between 6 and 7 p. m. of the 30th, wrecking several buildings. The damage to the town is estimated at $10,000.

Dallas: on the morning of the 18th, a violent wind and rain storm passed over this city. A school building was blown down and ten of thirty-two pupils were more or less seriously injured. Trees and fencing throughout the city were blown down. Very heavy rain accompanied the storm. This region was also visited by a heavy rain and wind storm on the night of the 27–28th. The rainfall was remarkably heavy. On the morning of the 28th, it was observed that the current in Trinity river had changed, the water running in the opposite direction. This phenomenon was supposed to be due to the swollen condition of the river and its tributaries below Dallas. Early settlers state that a similar phenomenon occurred once before, about twenty-five years ago.

Virginia.—Lynchburg: a severe wind storm prevailed during the night of the 2–3d. Several houses were blown down in the adjoining counties, and considerable damage was caused in the suburbs of this city.

Wisconsin.—Milwaukee: numerous disasters occurred on Lake Michigan during the storm of the 20th.

NAVIGATION.

OPENING OF NAVIGATION.

Lake Ontario.—Rochester, New York: navigation was resumed on the 3d, the first boat of the season arriving at Charlotte on that date.

Lake Erie.—Buffalo, New York: the steamer "William Edwards" left this port for Chicago on the 22d, being the first departure of the season.

Erie, Pennsylvania: navigation was resumed on the 19th.

Lake Huron.—Port Huron, Michigan: the steamer "Concord" left for the upper ports on the 8th, being the first departure of the season. The steamer "Flora," from Detroit, reached this port on the 9th, being the first arrival of the season.

Alpena, Michigan: the steamer "Flora," from Detroit, arrived on the 11th, being the first boat of the season.

Straits of Mackinac.—Mackinaw City, Michigan: the first arrival of the season occurred on the 24th; navigation was resumed on the 28th.

Lake Michigan.—Milwaukee, Wisconsin: the steam barge "William Edwards," bound from Buffalo to Chicago, passed this port on the 27th, and was the first boat of the season to pass through the Straits of Mackinac. The first steamer from the lower lakes arrived on the 30th.

Escanaba, Michigan: the first boat of the season arrived on the 21st.

Lake Superior.—Marquette, Michigan: the tug "A. L. Johnson," from Sandusky, Ohio, arrived on the 30th. Although considerable ice remained in the lake on that date, navigation was considered open for the season.

Fort Brady, Michigan: the first boat of the season arrived on the 25th.

Mississippi river.—Dubuque, Iowa: the first steamer of the season arrived on the 7th.

Saint Paul, Minnesota: the steamer "Saint Paul," the first boat of the season, from Saint Louis, arrived on the 16th, having experienced no difficulty in her passage upward.

Missouri river.—Leavenworth, Kansas: the steamer "Montana," the first boat of the season from Saint Louis, arrived on the 7th.

Yankton, Dakota: the first steamer of the season arrived on the 11th.

Fort Bennett, Dakota: the first steamer of the season arrived on the 12th.

North Branch Canal.—Catawissa, Columbia county, Pennsylvania: navigation was resumed on the 7th.

STAGE OF WATER IN RIVERS.

The Mississippi, Missouri and Ohio rivers were highest at the beginning and lowest at the close of the month, the lower Mississippi continuing above the danger line throughout the month. At Omaha, Nebraska, the Missouri river reached a point one foot above the danger line on the 6th. The Ohio river continued low throughout its course during the whole month, the highest stage at Cincinnati, Ohio, on the 6th, being more than eighteen feet below the danger line.

In the following table are shown the danger points at the various river stations; the highest and lowest stages for April, 1884, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, April, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:	Ft. In.		Ft. In.		Ft. In.	Ft. In.
Shreveport, Louisiana	29 9	30	20 6	13	16 7	3 11
Arkansas:						
Little Rock, Arkansas	33 0	29	13 10	11	7 5	6 5
Fort Smith, Arkansas		29	3 3	12	—1 7†	4 10
Missouri:						
Yankton, Dakota	20 0	4	20 1	25	6 6	13 7
Omaha, Nebraska	16 0	6	17 0	26, 27, 28	7 5	9 7
Leavenworth, Kansas	21 0	9	17 11	29	10 8	7 3
Mississippi:						
Saint Paul, Minnesota	14 6	3	9 10	27	6 0	3 10
La Crosse, Wisconsin	18 0	1	8 1	30	6 0	2 1
Dubuque, Iowa	21 10	3, 4	13 2	22, 23, 24	10 6	2 8
Davenport, Iowa	15 0	4	11 7	25, 27, 28	8 2	3 5
Keokuk, Iowa	14 6	1	16 7	29, 30	8 10	7 9
Saint Louis, Missouri	30 0	9	28 2	30	20 10	7 4
Cairo, Illinois	40 0	1	47 11	30	37 4	10 7
Memphis, Tennessee	34 0	2	34 0	30	30 5	3 7
Vicksburg, Mississippi	41 0	1	47 8	26 to 30	45 2	2 6
New Orleans, Louisiana*	—2 6	1, 2, 3, 5, 6	— 0 6	28, 29, 30	— 1 10	1 4
Ohio:						
Pittsburg, Pennsylvania	20 0	4	12 6	25	3 8	8 10
Cincinnati, Ohio	50 0	6	31 8	16, 22	17 8	14 0
Louisville, Kentucky	24 0	1	11 8	19	7 7	4 1
Cumberland:						
Nashville, Tennessee	42 0	1	22 7	14	7 2	15 5
Tennessee:						
Chattanooga, Tennessee	33 0	17	16 11	13	6 6	10 5
Monongahela:						
Pittsburg, Pennsylvania	29 0	4	12 6	25	3 8	8 10
Savannah:						
Augusta, Georgia		16	27 11	12	8 3	19 8
Willamette:						
Portland, Oregon		28	11 5	4	3 7	7 10
Sacramento:						
Red Bluff, California		15	21 0	7	4 0	17 0
Sacramento, California		20, 21, 22	23 6	7, 8	19 9	3 9
Mobile:						
Mobile, Alabama		14	17 4	9	14 11	2 5
Colorado:						
Yuma, Arizona		21	20 4	1	17 8	2 8

* Below high-water mark of 1874 and 1883. † below bench-mark.

ICE IN RIVERS AND HARBORS.

Kennebec river.—Portland, Maine: ice left the Kennebec river on the 10th, on which date navigation was resumed after a suspension of one hundred and twenty-nine days.

Kenduskeag creek.—Bangor, Maine: the breaking of the ice-

dam in the creek on the 6th caused damage estimated at $30,000.

Newfound lake.—Bristol, Grafton county, New Hampsbire: ice went out of the lake on the 28th.

Lake Champlain.—Burlington, Vermont: ice left the lake during the 19th and 20th.

Sackett's harbor.—Madison Barracks, New York: ice broke up on the 11th.

Niagara river.—Buffalo, New York: floating ice 3d to 7th, 9th, 10th, 12th to 15th, 17th to 23d.

Lake Huron.—Port Huron, Michigan: lake clear of ice on the 17th.

Thunder bay and Thunder bay river.—Alpena, Michigan: floating ice 2d to 5th.

Saint Clair river.—Port Huron, Michigan: floating ice on the 14th and 15th.

Straits of Mackinac.—Mackinaw City: on the 3d and 4th the ice in the straits was sufficiently strong to bear the weight of teams. The steamer "Algomah," in attempting to cross the straits on the 14th, was surrounded by ice and damaged to a considerable extent. On the 17th, the ice in the straits was from one to six feet in thickness. Straits clear of ice on the 26th.

Little bay de Noquet.—Escanaba, Michigan: ice broke up and moved out of the bay on the 15th.

Lake Michigan.—Milwaukee, Wisconsin: ice broke up along the shores on the 4th. The ice in Milwaukee river broke up and moved out on the 1st.

Lake Superior.—Duluth, Minnesota, 30th: the ice in the lake, although broken by the storms during the month, remained too solid to permit navigation.

Marquette, Michigan: the ice began to move out of the harbor on the 27th; on the 28th the harbor was clear of ice, but was again obstructed on the 30th.

Red river of the North.—Fort Pembina, Dakota: ice in river broke up on the 16th; river clear of ice on 19th.

Saint Vincent, Minnesota: the ice in river broke up and moved out on the 13th; river free of ice on the 19th.

Missouri river.—Fort Buford, Dakota: river clear of ice on the 3d.

Big Horn river.—Fort Custer, Montana: the ice in river broke up on the 1st.

FLOODS.

There was a moderate but steady decline in the lower Mississippi river during April. At Cairo the highest stage, forty-seven feet eleven inches, on the 1st, was ten feet seven inches above the lowest stage on the 30th. At Memphis, Tennesse, the highest point, thirty-four feet on the 2d, was three feet seven inches higher than the lowest stage on the 30th. At Vicksburg, Mississippi, and New Orleans, Louisiana, the monthly ranges were two feet six inches and one foot four inches respectively, the highest stages occurring at the beginning of the month and the lowest stages occurring at the close of the month.

The month closed with the river three feet seven inches below the danger-line at Memphis; four feet two inches above the danger-line at Vicksburg, and eight inches above the danger-line at New Orleans.

The following notes relating to the flood in the lower Mississippi during April have been received.

Cairo, Illinois: the bottom lands in this vicinity were still overflowed to a considerable extent on the 30th. In the lower portions of Cairo street railway travel was suspended on account of the overflowed condition of the tracks.

Memphis, Tennessee: traffic on the Memphis and Little Rock railroad, which had been suspended on account of the high water, was resumed on the 18th. From the 1st to 5th "Buffalo" gnats were very destructive to stock in the low-lands which had been recently overflowed.

Helena, Arkansas: on the 14th, the Mississippi was stationary at forty-four feet, ten inches above low-water mark. On that date about two-thirds of the area subject to overflow was inundated. The "Buffalo" gnats appeared in large numbers and were killing many mules and horses.

Vicksburg, Mississippi: on the 4th, the United States steamer "General Barnard" arrived from Saint Louis, bringing 100,000 rations for distribution among the flood sufferers.

New Orleans, Louisiana: on the 2d, about 2,000 residences in Saint Charles parish were under water; rations for 7,050 persons were sent to the sufferers in the neighborhood of the Black and Little rivers. The crevasse at Raleigh, in East Carroll parish, was 1,000 feet wide on this date.

The following extract from a communication received from Mr. Bernard Titche, dated New Orleans, May 11, 1884 has been furnished by Private G. E. Curtis, Signal Corps, United States Army:

* * * * * * *

This years' overflow is enormously disastrous. Many portions of the state are still under water and farmers are compelled reluctantly to abandon their lands, as they will be unable to make any crops this year. Within my memory there has been nothing so calamitous here. For the last five years the inundations have been annual and of increasing destructiveness. The sugar planters whose plantations are submerged are doubly unfortunate because the seed cane has been nearly if not all quite destroyed, and therefore, the crop for next year can be planted only at greatly increased expense, if at all. To add to this many parishes are suffering unprecedented loss of stock. The conditions attendant upon an overflow are usually very favorable for the breeding and propagation, in swamps or low lands of a species of gnat of unusual size, called the giant or "Buffalo" gnat. This is very destructive to cattle, and this year they have been extraordinarily large and poisonous. Horses, cattle, hogs, and sheep are worried to death. Farmers keep dense smoke throughout their fields to drive away these pests, and where farmers have been kept too busy (or have neglected) to feed their stock, (the stock in the absence of an overflow find abundant pasturage) horses and cattle have died of hunger at the smokes as the gnats would not allow them to leave. A very fatal disease called charbon (or charbone) is killing the animals that escape the gnats. It is believed to be caused by the poisonous gnats, but I suppose the better theory is, that the gnats merely scatter the disease by a sort of inoculation. Many well-to-do farmers have no horses or mules with which to work their grounds, and the tales of loss that reach me are truly pitiful. I trust the outcome may be better than is anticipated. I heard of a country friend who has lost a score of horses and mules, and hundreds of cattle, hogs, and sheep.

* * * * * * *

Floods occurred in the several states during April as follows:

Alabama..—Birmingham, Jefferson county: a heavy rainfall occurred on the morning of the 15th, which caused washouts on all railroads entering this place. Several miles of the track of the Georgia Pacific railroad, between Birmingham and Anniston, Calhoun county, were washed away, and the bridge near Birmingham was washed several feet out of place. In the vicinity of Anniston the streams were from two to three feet higher than ever before known. The farming lands in this region were badly washed.

Arkansas.—Hope, Hempstead county: a very heavy fall of rain occurred on the 18th. Two railway trestles in this vicinity were washed away, delaying trains in consequence.

Texarkana, Miller county: the heavy rain of the 18th caused washouts on the railroads in this vicinity.

Little Rock: the heavy rains of the 18th and 19th caused much damage to railroads and other property in this state. Trains were delayed on the Iron Mountain railroad on account of washouts, and many portions of the flat prairie country north of Devall's Bluff were inundated.

Hot Springs: a very heavy rainfall occurred during the night of 29-30th, which caused the Ouachita river to overflow. Trains on the Iron Mountain railroad were reported to have been delayed between Malvern and Texarkana on account of high water.

California.—Los Angeles: the heavy rains of the 9-10th caused washouts on the railroads both east and west of Los Angeles, resulting in the delay of trains.

San Francisco, 11th: the recent heavy rains caused serious washouts on the Southern Pacific railroad through Soledad cañon. At Newhall, Keene, and Mojave the railroad tracks were washed away.

Princeton, Colusa county: on the 17th the Sacramento river

reached a height of twenty-three feet six inches, which is two inches higher than any previous high-water record. The observer states that this unprecedented height was due not so much to the amount of rainfall as to the recent construction of levees and closing of outlets, as the rains preceding the rise were not as heavy as have occurred in former years.

Lathrop, San Joaquin county: a levee on the San Joaquin river broke on the morning of the 18th, causing a damaging overflow.

Connecticut.—Hartford: on the 18th the Connecticut river was twenty feet above its average height. All docks below Middletown, Middlesex county, were overflowed.

Georgia.—Atlanta: the heavy rainfall on the morning of the 15th caused injury to the railroads in this vicinity.

Milledgeville, Baldwin county: the heavy rains of the 16th and 21st caused much damage to the soil prepared for the spring crops.

Rome, Floyd county: on the 17th, more than one-half of the houses in Rome were inundated by the overflow of the Oostenaula and Etowah rivers. The water reached a height thirty-nine feet six inches above low-water mark, which is within eleven inches of the height of the great flood of March 11, 1881, when the highest stage of water ever known at this place occurred. The flood began on the 14th, and on the 17th, the water continued to rise at the rate of two inches per hour. The flooding of the town caused a general suspension of business. The water and gas works were inundated; the post office was closed and the telegraph office was moved. Great damage was done to the farms along the river, many farmers having their newly planted corn and cotton swept away.

Kansas.—Atchison, Atchison county: on the 18th White Clay creek, which runs through this city, was swollen by the heavy rains to a greater height than ever before known. Residents in lower parts of the city had to abandon their homes, and several buildings were floated away. Numerous bridges in this vicinity were washed away.

Louisiana.—Franklin, Saint Mary's parish: the heavy rains of the 5th and 6th caused a rise of ten inches in the Teche river. On the 6th the river was twenty inches below high-water mark of 1874, and a number of plantations along its east bank were under water.

Opelousas, Saint Landry parish: the heavy rains of the 4th and 5th caused an overflow of the bayous in this vicinity.

Maine.—Portland: The rivers and streams in this vicinity were much swollen on the 17th; numerous bridges and much lumber were swept away.

Biddeford, York county: on the 18th the Saco river reached the highest stage that has occurred since 1870. Reports from Augusta state that all of the mills at that place were compelled to suspend work.

Calais, Washington county: the lowlands between this place and Princeton were under water on the 18th. All of the mills along the Saint Croix river were shut down, and a bridge at Baring, eighty feet in length was washed away.

Bangor, 18th: the high water in the Penobscot river damaged the Maine Central railroad bridge and washed away a part of the Freeze boom at Orono. On the 23d the river reached the highest stage that has occurred for fourteen years, Many thousand feet of logs were swept away.

Brunswick, Cumberland county: the Androscoggin river reached the highest stage that has occurred during the last ten years.

Ellsworth, Hancock county, 18th: the water in Union river reached the highest stage that has occurred for several years.

Missouri.—Joplin, Jasper county: the very heavy rainfall of the 28th cause the neighboring streams to rise rapidly. The mines in this region were flooded to such an extent as to delay work for several days.

New Hampshire.—Laconia, Belknap county: the heavy rains of the 17–18th caused the water in Lake Winnepesaukee to rise to a height several feet above high-water mark. A number of mills suspended work, and great fears for the safety of the dam at Lake Village were entertained.

Nashua, Hillsborough county: on the 18th the Merrimac river had reached a point ten feet above low-water mark and flooded a part of the city.

Hanover, Grafton county: the Connecticut river reached a high stage at this place on the 18th. The meadows and highways adjacent to the river were submerged.

Province of Quebec.—Montreal: the heavy rains on the night of the 15–16th, flooded the lower portions of this city. The water in the river rose to within six inches of the top of the revetment wall on the river front.

Tennessee.—Chattanooga: the heavy rains on the 14th caused much damage to the Western and Atlantic railroad by washing away the tracks.

Texas.—Longview, Gregg county, 21st: the recent heavy rains caused an overflow of the Sabine river. The lowlands were inundated and about two million feet of logs were floated away.

HIGH TIDES.

Galveston, Texas: the strong southerly gale on the 28th and 29th caused considerable damage to the east end of Galveston island by forcing the water from the Gulf far in shore. The high surf wrecked a number of portable bath-houses on the beach.

Bangor, Maine, 26th, 27th, overflowing the wharves.
New River Inlet, North Carolina, 22d to 26th.
Hatteras, North Carolina, 3d.
Fort Macon, North Carolina, 25th, 26th.
Cedar Keys, Florida, 12th, 15th.
Indianola, Texas, 4th, 17th, 19th, 30th.

LOW TIDES.

New River Inlet, North Carolina, 3d.
Cedar Keys, Florida, 6th, 9th, 25th.
Indianola, Texas, 21st to 25th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for April, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.63 per cent. The percentages for the four elements are: weather, 86.56; direction of the wind, 79.70; temperature, 83.02; barometer, 86.55 per cent. By geographical districts they are: for New England, 76.72; middle Atlantic states, 83.09; south Atlantic states, 86.83; eastern Gulf states, 85.65; western Gulf states, 86.67; lower lake region, 82.81; upper lake region, 82.47; Ohio valley and Tennessee, 85.25; upper Mississippi valley, 84.90; Missouri valley, 82.39; north Pacific coast region, 90.74; middle Pacific coast region, 81.00; south Pacific coast region, 79.35. There were twenty-seven omissions to predict, out of 3,210 or 0.84 per cent. Of the 3,183 predictions that have been made, seventy-five, or 2.36 per cent., are considered to have entirely failed; one hundred and thirty-three, or 4.18 per cent., were one-fourth verified; four hundred and thirty, or 13.51 per cent., were one-half verified; five hundred and twenty-five, or 16.49 per cent., were three-fourths verified; 2,020, or 63.46 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During April 1884, one hundred and sixty-six cautionary signals were ordered. Of these, one hundred and forty-four, or 86.75 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. Sixty-three cautionary off-shore signals were ordered, of which number, fifty-two, or 82.54 per cent., were fully justified both as to direction and velocity; sixty, or 95.24 per cent., were justified as to direction; and fifty-five, or 87.30 per cent., were justified as to velocity. Two hundred and twenty-nine signals of all kinds were ordered, one hundred and ninety-six, or 85.59 per cent., being fully justified. These do not include signals ordered at display stations, where the velocity of the